

### REMARKS

The present application includes claims 187-246. Claims 1-186 are cancelled. Claims 191 and 199 are currently amended.

The drawings stand rejected, since Figs. 7A, 7B, 9 and 10 are objected to because there are no descriptive legends for some of the boxes. Corrected drawings are attached herewith to overcome the rejection.

Claim 191 stands rejected under 35 USC §112, second paragraph, as lacking an antecedent for "the momentary power". The claim was amended to overcome the rejection.

Claims 187-189, 195-200, 204 and 207-208 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109).

Claim 190 stands rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Roberts (U.S. patent 6,031,647).

Claims 191-194 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951).

Claims 201-203 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Dodley (U.S. patent 5,966,229).

Claims 187 and 205-206 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109).

Claim 209 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Masuda et al.

The Examiner stated that Javitt and Willebrand teach an optical system for transmission over free space and that Heidemann teaches an optical receiver with an optical pre-amp 10 whose amplification or attenuation is variable under control of AGC 7. The Examiner stated that it would be obvious to combine either of Willebrand and Javitt with Heidemann.

Applicants respectfully disagree and submit that the Examiner has not established a *prima facie* case of obviousness with regard to claim 187, since it would not have been obvious to

combine the teachings of either Javitt or Willebrand with Heidemann. Javitt and Willebrand relate to free space transmission, while Heidemann relates to transmission through fibers. The characteristics of signals being transmitted over free space are very different from those of signals transmitted through fibers and the methods used in handling the received signals are therefore very different. For example, the attenuation of light beams passed through free space is much greater than the attenuation of light beams passed through fibers. Even more important, the variations in the attenuation caused by the atmosphere in free space transmission is much larger than the variations in the attenuation through fibers. What works on beams transmitted through fibers does not necessarily work and/or is not useful for free space light beams.

Relating specifically to the combining of Willebrand and Heidemann, the Examiner stated on page 8 of the office action, that: "one of ordinary skill in the art would have been motivated to combine the teaching of Heidemann with the optical space communication system of Willebrand because photodetectors are sensitive and can be damaged by optical power if received beam power is too strong." Applicants note, however, that Willebrand and all other designers of free space transmission systems, are not worried about receiving signals with power which is too high, because it would damage a photo-detector or for any other reason. Rather, in free space transmission systems, the worry of designers, including the optical free space references cited by the Examiner, is that the received signal is too weak, not too strong; see Willebrand, col. 2, lines 40-63, Dodley, col. 1, lines 19-23 and Javitt, col. 1, lines 28-34. Willebrand, for example, uses special avalanche photo-detectors, together with transmitting and receiving ERDAs (col. 13, lines 54-64), in order to achieve high enough reception power, to allow sufficient transmission distances (col. 2, lines 40-63).

In summary, Willebrand does not teach the use of attenuations because in free space transmission, too high a reception signal is not a possibility to worry about. A reader of Willebrand wanting to combine it with the teachings of Heidemann would ignore the suggestion to use attenuations, as this suggestion is applicable only for beams passing through fibers. Furthermore, given the limited dynamic range of EDFAs, discussed below, the use of a portion of the dynamic range for attenuations would be counter productive as it would reduce the maximal amplification provided by the EDFA, while it is desired to provide as high as possible an amplification for the weak signals received from the atmosphere.

Relating specifically to the combining of Javitt with Heidemann, the same arguments discussed regarding Willebrand are applicable to Javitt. In addition, applicants respectfully submit

that the Examiner has not provided a *prima facie* case of obviousness with regard to Javitt and Heidemann since both of the combined references are missing the limitation "directing a received beam including at least a portion of the transmitted beam into at least one fiber" of claim 187. In Javitt, the light beam from the atmosphere is collected by a receiver 80 which may be another lens system (col. 2, lines 51-56). In Heidemann, the beam is already in the fiber, since it is transmitted along its entire travel path within a fiber. In order to use the method of Heidemann, Javitt would have to add an additional step of directing the light beam into a fiber. But Javitt would have no incentive to do so, since one of the major reasons set forth to do so, is to prevent overloading the photo-detector. In free-space systems, however, this is not a concern to worry about.

The dependent claims add further patentability over the prior art. Claim 188, for example, requires changing the amplitude by a factor determined responsive to an extent to which the received beam was affected by the atmosphere. Heidemann does not change the amplitude by an extent to which the beam was affected by the atmosphere, as Heidemann relates to fiber communications. Contrary to that stated by the Examiner, col. 1, line 14 of Heidemann does not mention transmission through the atmosphere, but rather relates to the affect of temperature and time of day on the transducer.

Claim 195, for example, requires a rate of variation of the amplification or attenuation of at least 1 kHz. The Examiner stated that it is obvious to choose a time constant of 1kHz. Applicants respectfully submit that EDFAs cannot operate with such a time constant, as stated in the present application on page 28, line 34. A response time of 9 ms (corresponding to 111Hz) is stated, for example, in the article "Dynamic Gain and Output Power Control in a Gain-Flattened Erbium-Doped Fiber Amplifier," Seo Y. Park, Hyang K. Kim, Gap Y. Lyu, Sun M. Kang, and Sang-Yung Shin, *IEEE Photonics Technology Letters*, vol. 10, no. 6, pp. 787-789, June 1998, as cited at <http://www.gel.ulaval.ca/~rusch/pub/edfa.htm>. A copy of this page, downloaded on January 26, 2005 is attached herewith.

As Heidemann relates to light beams transmitted through fibers, the variation rate of the EDFA is more than sufficient. For light beams passed through the atmosphere, however, the variation rate of EDFAs is not sufficient, and faster apparatus is required. Such faster apparatus is taught in the present application, for example, in Figs. 7A and 7B.

Claim 198, for example, requires attenuating by an optical attenuator. Applicants respectfully submit that the term attenuator refers to an element that substantially only attenuates. Therefore, an EDFA which primarily amplifies cannot be considered as an attenuator.

Claim 199 as amended, for example, requires additionally passing the received beam through an additional optical apparatus which amplifies the received beam. Heidemann does not show such an additional amplifying optical apparatus.

Claim 207, for example, requires a high amplification or attenuation variation rate, suitable for AGC of the beam received from the atmosphere. This is not achievable by an EDFA and is not taught or suggested by Heidemann which does not relate to atmospheric transmission.

Claims 210-211 and 214 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109).

Claim 215 stands rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951).

Claims 210 and 212 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109).

Claim 213 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951).

Claim 216 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Masuda et al.

Applicants respectfully disagree and submit that the Examiner has not established a *prima facie* case of obviousness with regard to claim 210 and its dependent claims, since the requirement of passing the beam through an optical amplitude modifier having a variable amplification or attenuation with a dynamic range of at least about 30dB, is not taught or suggested by any of the cited references.

The Examiner cited col. 1, line 54, of Heidemann, which states a dynamic range of approximately 80dB. This number, however, relates to the entire system of Heidemann, including photodiode 1 and pre-amplifier 2, which contribute nearly all the dynamic range of the system. This is clear from the fact that EDFAs do not have a dynamic range of amplification or attenuation even close to 30dB. For example, [http://www.lightreading.com/document.asp?doc\\_id=12591](http://www.lightreading.com/document.asp?doc_id=12591) relates on March 7, 2002, more than two years after the filing of the present application, to an EDFA (the 11310 C-band amplifier) with a gain dynamic range of more than 15dB, much less than 30dB. A copy of this reference is attached herewith. Applicants further note that Willebrand states a total

gain of both the transmitting and receiving ERDAs, which reaches a combined gain of about 50dB (col. 13, lines 56-58). Thus, each ERDA has a gain of about 25dB. As Willebrand does not relate to attenuations, the maximal gain dynamic range is 25dB. Applicants note, however, that the EDFAs of Willebrand probably have characteristics similar to those defined, in <http://www.onetta.com/pc/downloads/datasheet11300.pdf> titled "IOE 11300 EDFA Metro/Regional EDFA Series" (also relating to the 11310 C-band amplifier), which states a minimal gain of 10dB, resulting in a dynamic gain range of 15dB.

The dependent claims are allowable at least because their base claim is allowable. Applicants note, however, that at least some of the dependent claims add further patentability over the art. For example, as mentioned above, the use of an attenuator, as required by claim 214, is not taught or suggested by the cited art.

Claims 217-218, 220 and 222 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109).

Claim 221 stands rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951).

Claims 217 and 219 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109).

Claim 223 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Masuda et al.

Applicants respectfully disagree and submit that the Examiner has not established a *prima facie* case of obviousness with regard to claim 217, since the requirement of using optical apparatus having a high amplification or attenuation variation rate, suitable for automatic gain control (AGC) of a beam received from the atmosphere, is not taught or suggested by any of the cited references.

Heidemann has no reason to use a high amplification or attenuation variation rate as Heidemann does not deal with beams received from the atmosphere. Applicants also note that EDFAs, suggested for use by Heidemann and Willebrand, could not achieve, at least at the time of filing of the present application, sufficiently fast gain control for beams transmitted through the atmosphere and do not have a sufficient gain variation for AGC of beams received from the atmosphere. In Willebrand, the variable gain of the ERDAs is used for a general adjustment of the power level. This is evident from the fact that Willebrand does not mention AGC, from the fact that



Willebrand relates to previously determined power levels (col. 13, lines 5-7 and lines 40-53), and the fact that the controller establishes the power gain in a dampened, time delayed step-by-step manner (col. 12, lines 43-47).

The dependent claims are allowable at least because their base claim is allowable. Applicants note, however, that at least some of the dependent claims add further patentability over the art. For example, the limitations of claims 218, 220 and 222 were discussed above regarding other claims.

Claims 224 and 231-232 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888).

Claims 224 and 229 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109).

Claims 224-226 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109).

Claims 227-228 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951).

Claim 230 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Masuda et al.

Applicants respectfully disagree and submit that the Examiner has not established a *prima facie* case rejection, since the Examiner did not relate to the requirement of claim 224 that the optical amplitude modifier be adapted to substantially eliminate effects of atmospheric turbulence from the received beam. As discussed regarding claim 217, this is not taught or suggested by the art, since Heidemann deals with optical beams transmitted through fibers and Willebrand relates to general correction and not to elimination of turbulence.

The dependent claims are allowable at least because they depend on allowable claims.

Claims 233 and 236 stand rejected under 35 USC §103(a) as being unpatentable over Javitt et al. (U.S. patent 6,031,648), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951).

Claims 234 and 235 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand et al. (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951) and Masuda et al.

Claims 233 and 237 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951).

Claims 238 and 239 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand et al. (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951) and Jackel et al. (U.S. patent 6,175,436).

Applicants respectfully disagree and state that the Examiner has not established a *prima facie* case of obviousness with regard to claim 233, since the Examiner did not show the requirement of providing a light beam in which each of the one or more wavelengths has a substantially constant power. Even if the Examiner can find a reference which suggests providing a light beam with constant power for a beam received from a fiber, it would not be obvious to use its teachings for beams transmitted through the atmosphere, since the conditions are totally different. To the best of applicants' knowledge, until the filing of the present application, it was not considered possible to pass a free space beam through an optical amplitude modifier adapted to change the amplitude of the beam, so as to provide a light beam in which each of the one or more wavelengths has a substantially constant power. Therefore, AGC was performed only on electrical signals.

The dependent claims are allowable at least because they depend on allowable claims.

Claims 240, 241, 244 and 246 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109).

Claim 245 stands rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Masuda et al.

Claims 242-243 stand rejected under 35 USC §103(a) as being unpatentable over Willebrand (U.S. patent 6,239,888), in view of Heidemann (US patent 5,335,109) and further in view of Sugawara (U.S. patent 6,057,951).


Applicants respectfully disagree and state that the Examiner has not established a *prima facie* case of obviousness with regard to claim 240 since it would not have been obvious to combine the teachings of either Javitt or Willebrand with Hiedemann, as discussed above with reference to claim 187.

The dependent claims are allowable at least because they depend on allowable claims.

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In view of the above remarks, applicants submit that the claims are patentable over the prior art. Allowance of the application is respectfully awaited. If, however, the Examiner is not convinced and the Examiner is of the opinion that a telephone conversation may forward the present application toward allowance, applicants respectfully request that the Examiner call the undersigned at 1 (877) 428-5468. Please note that this is a direct *toll free* number in the US that is answered in the undersigned's Israel office. Israel is 7 hours ahead of Washington.

Respectfully submitted,  
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